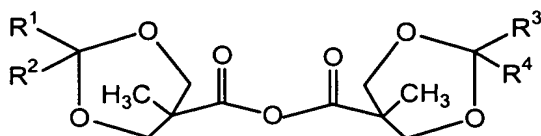


WHAT IS CLAIMED IS:

1. An anhydride having the structure:



wherein,

R^1 , R^2 , R^3 , and R^4 are members independently selected from substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl and substituted or unsubstituted aryl.

2. The anhydride according to claim 1, wherein each of R^1 , R^2 , R^3 , and R^4 is an independently selected C_1 - C_6 unsubstituted alkyl group.

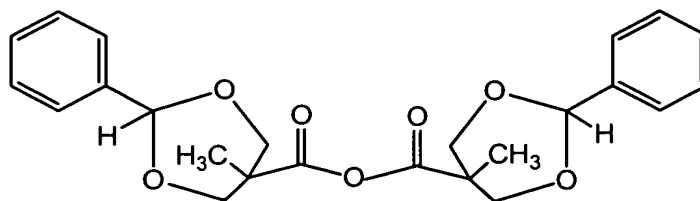
3. The anhydride according to claim 2, wherein said unsubstituted alkyl group is a member selected from the group methyl, ethyl and propyl.

4. The anhydride according to claim 1, wherein said anhydride is a solid, which is substantially free of coupling reagent derived side products.

5. The compound according to claim 1, prepared by a method consisting essentially of:

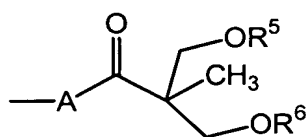
- (a) combining benzylidene-2,2-bis(methoxy)propanoic acid, N,N' -dicyclohexylcarbodiimide and an organic solvent, thereby forming a reaction mixture in which said anhydride is formed;
- (b) filtering said reaction mixture, thereby removing precipitated dicyclohexylurea from said reaction mixture;
- (c) precipitating said anhydride from said reaction mixture by contacting said reaction mixture with a hydrocarbon solvent, thereby producing said anhydride.

6. An anhydride having the structure:



7. The anhydride according to claim 6, wherein said anhydride is a solid and is substantially free of coupling reagent derived side products.

8. A dendrimer which is substantially free of urea side products, said dendrimer comprising a subunit having the structure:

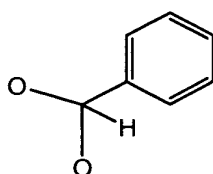


wherein,

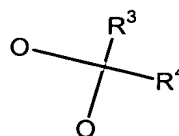
A is an active group, which is a member selected from NH, S and O;

R⁵ and R⁶ are members independently selected from the group consisting of H,

diagnostic agents, therapeutic agents, analytical agents, moieties comprising a reactive group or, alternatively R⁵ and R⁶ together with the oxygen atoms to which they are attached form a structure which is a member selected from the group consisting of:



; and



9. The dendrimer according to claim 8, wherein A is a component of a polymer.

10. The dendrimer according to claim 9, wherein said polymer is a member selected from the group consisting of nucleic acids, linear poly(alkylene oxides), star poly(alkylene oxides), polysaccharides, poly(amino acids) and poly(hydroxystyrene).

11. The dendrimer according to claim 8, wherein said polysaccharide is a member selected from cyclodextrin, starch, hydroxyethyl starch and dextran.

12. The dendrimer according to claim 8, wherein said poly(amino acid) comprises lysine, tyrosine, serine, cysteine, arginine, histidine and combinations thereof.

13. The dendrimer according to claim 7, wherein said polymer is a synthetic organic polymer with pendant NH groups, OH groups, SH groups and combinations thereof.

14. The dendrimer according to claim 11, wherein said synthetic organic polymer is a member selected from poly(vinylphenol), poly(hydroxymethacrylate), poly(N-2-hydroxypropylmethacrylamide), poly(diallylamine), poly(lactic acid) and poly(hydroxymethylcaprolactone), poly(4-hydroxyethylcaprolactone).

15. The dendrimer according to claim 6, wherein said therapeutic agent is a member selected from the group consisting of antiproliferative agents, proteins, anti-cancer chemotherapeutic agents, antibiotics, antivirals, and antiparasitics.

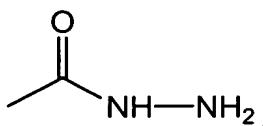
16. The dendrimer according to claim 6, wherein said diagnostic agent is a member selected from MRI contrast agents, X-ray contrast agents, CT contrast agents, PET contrast agents, ultrasonography contrast agents, fluorescent agents, chromophoric agents and radioisotopes.

17. The dendrimer according to claim 8, wherein said subunit repeats from 2 to 100 times.

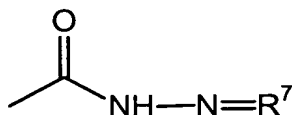
18. The dendrimer according to claim 17, wherein said subunit repeats from 4 to 50 times.

19. The dendrimer according to claim 18, wherein said subunit repeats from 8 to 24 times.

20. A dendrimer according to claim 6, wherein at least one of R⁵ and R⁶ has the structure:



5
1 21. A dendrimer according to claim 6, wherein at least one of R⁵ and R⁶
2 has the structure:

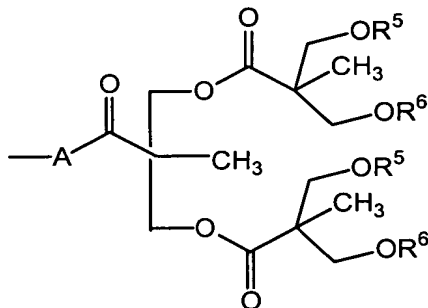


wherein, R⁷ is a member selected from the group consisting of diagnostic agents,
therapeutic agents and analytical agents.

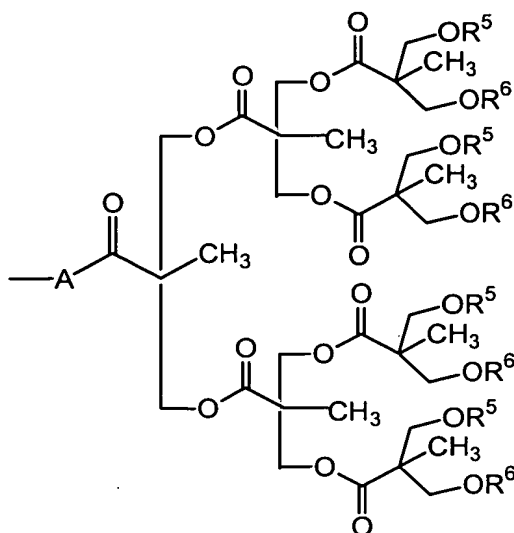
1 22. A dendrimer according to claim 19, wherein R⁷ is a doxorubicin
2 derivative.

1 23. A pharmaceutical formulation comprising a dendrimer according to
2 claim 6 and a pharmaceutically acceptable carrier.

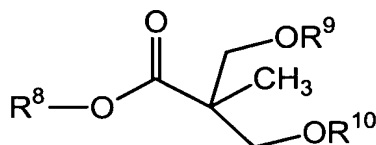
1 24. A dendrimer comprising a subunit having the structure:



1 25. A dendrimer comprising a subunit having the structure:



26. A dendrimer having the structure:



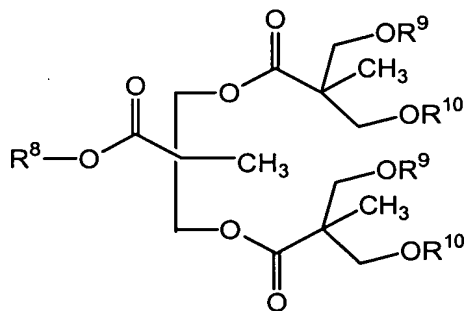
wherein,

R⁸ is a nucleic acid; and

R⁹ and R¹⁰ are members independently selected from H and a poly(ethylene oxide) residue.

27. The dendrimer according to claim 24, said dendrimer being substantially free of urea side products.

28. A dendrimer comprising the structure:



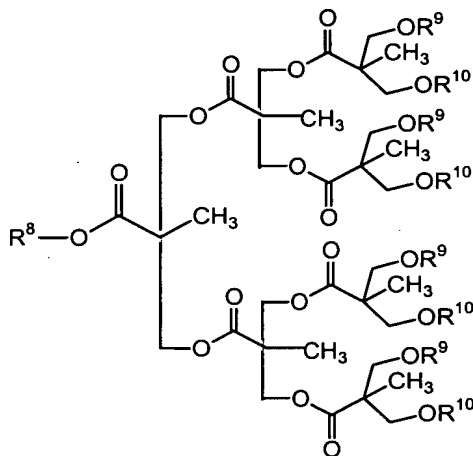
wherein,

R⁸ is a nucleic acid; and

R⁹ and R¹⁰ are members independently selected from H and a poly(ethylene oxide) residue.

1 29. The dendrimer according to claim 26, said dendrimer being
2 substantially free of urea side products.

1 30. A dendrimer comprising the structure:



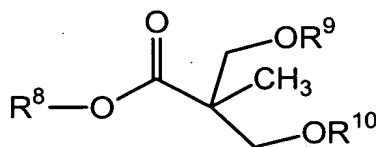
2
3 wherein,

4 R⁸ is a nucleic acid; and

5 R⁹ and R¹⁰ are members independently selected from H and a poly(ethylene
6 oxide) residue.

1 31. The dendrimer according to claim 28, said dendrimer being
2 substantially free of urea side products.

1 32. A biological compartment comprising a membrane defining an interior
2 space, said interior space comprising a dendrimer comprising a subunit having the structure:

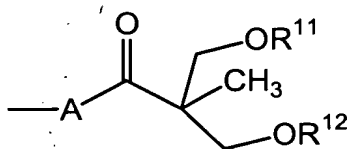


3
4 wherein,

5 R⁸ is a nucleic acid; and

6 R⁹ and R¹⁰ are members independently selected from H and a poly(ethylene
7 oxide) residue.

1 33. A biological compartment comprising a membrane defining an interior
2 space, said interior space comprising a dendrimer comprising a subunit having the structure:



wherein,

A is a residue of an active group; and

R¹¹ and R¹² are members independently selected from the group consisting of H, therapeutic agents and diagnostic agents.

34. The biological compartment according to claim 31, wherein said therapeutic agent is a member selected from the group consisting of antiproliferative agents, proteins, anti-cancer chemotherapeutic agents, antibiotics, antivirals, nucleic acids, and antiparasitics.

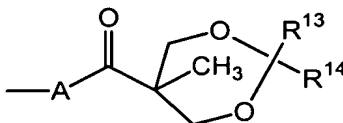
35. The biological compartment according to claim 31, wherein said diagnostic agent is a member selected from MRI contrast agents, X-ray contrast agents, CT contrast agents, PET contrast agents, ultrasonography contrast agents, nucleic acids, fluorescent probes, chromophoric probes and radioisotopes.

36. The biological according to claim 31, wherein A is a residue of a core moiety, and said core moiety is a poly(alkylene oxide) residue.

37. The biological compartment according to claim 36, wherein said core moiety is a poly(ethylene oxide) residue.

38. The biological compartment according to claim 31, wherein said biological compartment is a member selected from cells and organelles.

39. A method of producing a protected first generation dendrimer substantially free of urea side products, said dendrimer comprising a subunit having the structure:



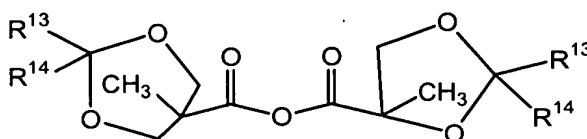
wherein,

A is an active group residue selected from NH, O and S on a core moiety; and

R¹³ and R¹⁴ are components of a diol protecting group and are members independently selected from H, substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl and substituted or unsubstituted aryl, with the proviso that when R¹³ is H, R¹⁴ is other than H;

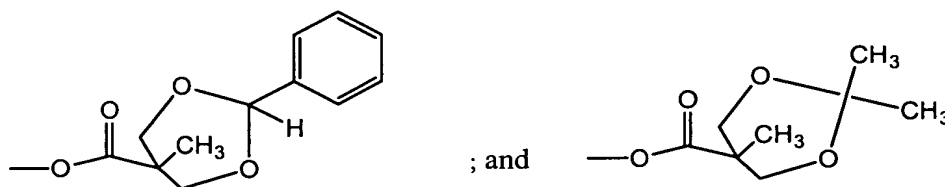
said method comprising:

- (a) forming a reaction mixture by contacting a core moiety comprising A with an acylating group in an organic solvent, said acylating group having the structure:

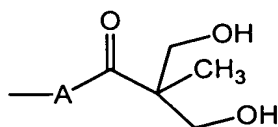


- thereby acylating A, forming said dendrimer; and
(b) extracting said reaction mixture with an aqueous solution, thereby removing impurities.

40. The method according to claim 37, wherein said subunit is a member selected from the group consisting of:



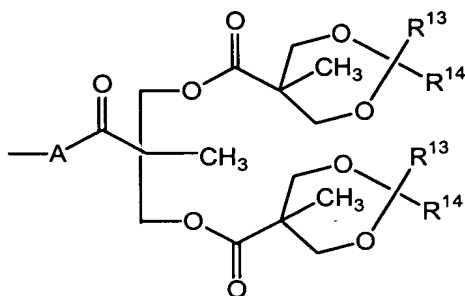
41. The method according to claim 39, further comprising:
(c) removing said diol protecting group, thereby forming a first generation dendrimer comprising a subunit having the structure:



42. A dendrimer prepared by the method according to claim 39.

43. The dendrimer according to claim 40, wherein said dendrimer is a solid.

1 44. A method of producing a protected second generation dendrimer
2 substantially free of urea side products, said dendrimer comprising a subunit having the
3 structure:

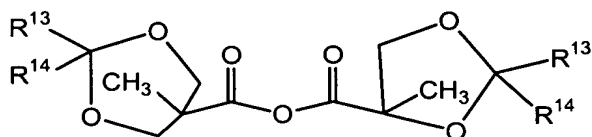


4
5 wherein,

6 A is an active group selected from NH, O and S on a core moiety; and
7 R¹³ and R¹⁴ are components of a diol protecting group and are members
8 independently selected from H, substituted or unsubstituted alkyl, substituted
9 or unsubstituted heteroalkyl and substituted or unsubstituted aryl, with the
10 proviso that when R¹³ is H, R¹⁴ is other than H;

11 said method comprising:

12 (a) contacting said first generation dendrimer according to claim 39 with an
13 acylating group having the structure:

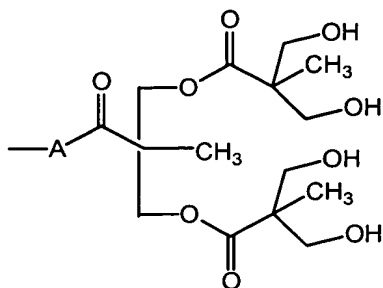


14 thereby acylating A, forming said dendrimer; and

15 (b) extracting said reaction mixture with an aqueous solution, thereby
16 removing impurities.

17
1 45. The method according to claim 44, further comprising:

2 (c) removing said diol protecting group, thereby forming a second generation
3 dendrimer comprising a subunit having the structure:



46. A dendrimer prepared by the method according to claim 44.

47. A dendrimer prepared by the method according to claim 44, wherein said dendrimer is a solid.

48. A method of enhancing water solubility of an agent, said method comprising forming a conjugate between said agent and a dendrimer comprising a subunit having the structure:

